REMARKS

This application has been reviewed in light of the Office Action dated August 7, 2003. Claims 1-4 and 6-15 are presented for examination, of which claims 1, 7, and 11-15, the independent claims, have been amended to define more clearly what Applicant regards as his invention. Favorable reconsideration is requested.

Claims 1, 3, 4, 6, 12, and 14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,572,632 (*Laumeyer et al.*), in view of U.S. Patent No. 5,872,895 (*Zandee et al.*) and U.S. Patent No. 5,495,542 (*Shimomura et al.*). Claims 7-11 and 13 were rejected under Section 103(a) as being unpatentable over U.S. Patent No. 5,923,834 (*Thieret et al.*) in view of *Laumeyer et al.* and *Shimomura et al.* Claim 2 was rejected under Section 103(a) as being unpatentable over *Laumeyer et al.* in view of *Zandee et al.* and *Shimomura et al.* as applied to claim 1, and further in view of *Thieret et al.* Claim 14 was rejected under Section 103(a) as being unpatentable over *Laumeyer et al.* in view of *Zandee et al.*, *Shimomura et al.*, and U.S. Patent No. 5,048,078 (*Satomi et al.*), and claim 15 was rejected under Section 103(a) as being unpatentable over *Thieret et al.* in view of *Laumeyer et al.*, *Shimomura et al.*, and *Satomi et al.*

As shown above, Applicant has amended independent claims 1, 7, and 11-15 in terms that more clearly define what he regards as his invention. Applicant submits that these amended independent claims, together with the remaining claims dependent thereon, are patentably distinct from the cited prior art for at least the following reasons.

As is discussed in the specification, output images of a printing apparatus change depending on changes in environmental conditions such as temperature, humidity, and the like. If the printing apparatus is of an electrophotographic type, formed visible

images change due to the deterioration of expendables of the printing apparatus, such as a drum or toner cartridge.

Conventional printing apparatuses are capable of calibrating to correct for the above-mentioned changes or deteriorations of images, but generally these calibrations are limited. For example, in order to match the density data of an original image to be output by a current printer in correspondence with the original density data, a controller unit generates binary image data to be input to a engine unit on the basis of the original image in consideration of the density differences. However, when a host computer binarizes data and transmits the binary image data to the printing apparatus, the controller cannot detect the density differences between the original image and output image, and thus calibration in the printer cannot sufficiently correct the data.

The present invention provides a solution to this problem, making it possible for the image processing to reflect the condition information of the image output unit. The aspect of the present invention set forth in claim 1 is an image processing apparatus that includes a communicator, an input unit, an acquisition unit, and an image processor. The communicator performs two-way communications, via a communication line, with an image output unit, which includes an update unit for updating condition information indicating a condition of the image output unit and a memory for storing the condition information. The condition information is obtained by forming color patches and measuring colors on the color patches. The input unit inputs an image output instruction to be communicated to the image output unit via the communication line. In response, the acquisition unit acquires the condition information stored in the image output unit by utilizing the communicator to provide two-way communication.

The image processor performs calibration processing of the image data comprising of pixels, each having a bit length, in accordance with the condition information acquired by the acquisition unit. The image processor decreases a bit length for each pixel of calibrated image data processed in accordance with the condition information which is used for calibration and then outputs the bit-length-decreased image data to the image output unit via the communication line.

Specifically, in a preferred embodiment, the image processing apparatus (host computer 100) acquires the condition information (correction data, for calibration, regarding the condition of the image output unit) generated by a color calibration unit in response to an image output instruction, and then performs calibration processing to generate bitmap data formed by pixels, each of which is quantized (bit-length-decreased) using the condition information. Calibration processing on the image data to reflect the condition information is performed prior to the bit-length-decrease processing. By virtue of these features of claim 1, high-precision calibration can be realized because the condition information is updated upon an image output instruction and the image data is calibrated in accordance with the updated condition information before the bit-length-decreasing process is performed. Second, the image processing apparatus is able to transmit quantized, high quality image data to an output unit because the calibration process and bit-length-decrease process is performed in the image processing apparatus.

The applied art, alone or in combination, is not seen to disclose or suggest the aspect of the invention as recited in independent claim 1, particularly with respect to an image processor performing calibration processing of image data comprising of pixels, each having a bit length, in accordance with the updated condition information, acquired by the acquisition unit in response to an image output instruction, where the image processor

decreases a bit length for each pixel of the calibrated image data processed in accordance with the condition information and then outputting the bit-length-decreased image data to the image output unit via the communication line.

Laumeyer et al., as understood by Applicant, relates to a printing system which permits choosing any of a number of multiple output devices, such as color printers, for a printing job in which an output image is to be printed on a selected medium. The *Laumeyer et al.* system permits selecting alternative media for such a printing job, and that all such selections are made without requiring further processing of pixel data or image input data by the system raster image processor. Apparently, *Laumeyer et al.* teaches converting a color space using a profile generated by measuring the color of a patch and transmitting data stored in a frame buffer 16 to a printer 19 (output device).

Specifically, the output device color gamut is characterized to establish the correspondence of printed colors to an intermediate L*a*b* color space. Each permitted spatial location in the L*a*b* color space that is within the output device color printer reproducible color gamut is arranged to transform to that set of CMY coordinates paired by an effective or measured color patch to that permitted spatial location that is closer to the location being transformed than any other similarly paired permitted spatial location. Similarly, each permitted spatial location in the L*a*b* color space outside of the output device color printer reproducible color gamut is arranged to transform to that set of CMY coordinates associated with the effective or measured color patch at the edge of this gamut having the closest color to that specified by the location being transformed (column 11, lines 7-19).

Accordingly, *Laumeyer et al.* merely discloses reproduction of color images generated by one of alternative input sources through the use of one of alternative output devices, where the output device color gamut is characterized to determine a correspondence of printed colors to an intermediate L*a*b* color space. However, nothing has been found in *Laumeyer et al.* that would teach or suggest the features of the claimed invention, and in particular an image processor <u>performing calibration processing</u> of image data comprising of pixels, each having a bit length, in accordance with the <u>updated condition information, acquired by the acquisition unit in response to an image output instruction</u>, where the image processor decreases a bit length for each pixel of the calibrated image data processed in accordance with the <u>condition information</u> and then outputting the bit-length-decreased image data to the image output unit via the communication line, as recited in claim 1.

The Office Action alleges that *Laumeyer et al.* teaches an update unit for updating condition information indicating a condition of the image output unit, and cites column 11, lines 50-60 as support therefor. However, Applicant disagrees with this understanding of *Laumeyer et al.*, and submits that additional profiles (characterization of output device color gamut) for either new output devices or new media for current output devices are able to be added to the *Laumeyer et al.* system, but not to update the condition information indicating the condition of the image output unit. Further, the characterization of output color printers is performed prior to an operator choosing to output a print job, and <u>not</u> in response to an image output instruction. *Laumeyer et al.*, at column 11, line 62, to column 12, line 14, states that each output color printer which can receive data from frame buffer 16 must have been similarly characterized and have similar profiles therefor stored

within. Thus an operator may selectively choose at a convenient time, which of the output device color printers 19, that are in operable communication with frame buffer 16 for receiving job files, is to receive a job or jobs. Furthermore, the Office Action correctly states that *Laumeyer et al.* does not teach a two-way communicator, the acquisition unit to use the communicator for acquiring the condition information, and the image processor decreasing a bit length for each pixel of image data.

For at least these reasons, Applicant submits that claim 1 is clearly patentable over *Laumeyer et al.*, taken alone.

The Office Action cites *Zandee et al.* as remedying some of the deficiencies of *Laumeyer et al.*, and in particular teaching the communicator and acquisition unit of claim 1. *Zandee et al.* relates to a method for object-based color matching when printing color documents. Apparently, *Zandee et al.* teaches communicating color information between a device and a computer. The Examiner cites column 4, lines 15-30, as disclosing the acquisition unit of claim 1. Applicant respectfully disagrees. The ColorSync™ Utilities of *Zandee et al.*, although communicating information between various devices (column 4, lines 7-11), does not do so in response to an image output instruction. Nothing has been found in *Zandee et al.* that would teach or suggest the features recited in claim 1, and in particular, an image processor <u>performing calibration</u> processing of image data comprising of pixels, each having a bit length, in accordance with the <u>updated condition information, acquired by the acquisition unit in response to an image output instruction</u>, where the image processor decreases a bit length for each pixel of the calibrated image data processed in accordance with the <u>condition information</u> and then outputting the bit-length-

decreased image data to the image output unit via the communication line, as recited in claim 1.

Shimomura et al. is cited in the Office Action as remedying the deficiencies of *Laumeyer et al.*, and *Zandee et al.* *Shimomura et al.* relates to image processing using a neural network. In Applicant's view, nothing has been found in *Shimomura et al.* that would teach or suggest an image processor performing calibration processing of image data comprising of pixels, each having a bit length, in accordance with the updated condition information, acquired by the acquisition unit in response to an image output instruction, where the image processor decreases a bit length for each pixel of the calibrated image data processed in accordance with the condition information and then outputting the bit-length-decreased image data to the image output unit via the communication line, as recited in claim 1.

For all these reasons, Applicant strongly urges that even if *Laumeyeret al.* is combined with *Zandee et al.* and/or *Shimomura et al.* in the proposed manner (and assuming *arguendo* that such combination would be proper), the result would not meet the terms of claim 1. Accordingly, claim 1 is believed to be clearly allowable over *Laumeyeret al.*, *Zandee et al.*, and *Shimomura et al.*, taken separately or in any proper combination.

Satomi et al. is cited in the Office Action as merely teaching to use a computer readable storage medium to store program code. As such, *Satomi et al.* fails to remedy the deficiencies of *Laumeyeret al.*, *Zandee et al.*, and *Shimomura et al.*, as discussed above.

Independent claims 12 and 14 are method and computer-readable storage medium claims, respectively, corresponding to apparatus claim 1, and are believed to be patentable for at least the same reasons as discussed above in connection with claim 1.

The aspect of the present invention set forth in claim 7 is an image processing apparatus connected, via a communication network, with a host computer and a plurality of image output units. Each image output unit is adapted to perform a function of updating condition information of the image output unit, the condition information being obtained by forming color patches and measuring colors on the color patches. The image processing apparatus includes an input unit for inputting the condition information updated by the plurality of image output units, a memory for storing the inputted condition information in association with each of the plurality of image output units, and a transmitter for transmitting the stored condition information to the host computer in accordance with a request for acquiring the condition information issued by the host computer. The apparatus also includes a management unit for managing an image output job of the host computer. The condition information is obtained by forming color patches and measuring colors on the color patches, and the host computer performs calibration processing of image data comprising of pixels, each having a bit length, in accordance with the condition information transmitted by the transmitter. The host computer decreases a bit length for each pixel of calibrated image data processed in accordance with the condition information and then outputs the bit-length-decreased image data to the image output unit via the communication line, and each of the plurality of image output units outputs an image based on the image data processed by the host computer.

Applicant submits that a *prima facie* case of obviousness has not been made out as to claim 7. A *prima facie* case of obviousness requires that three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference(s) or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references when combined must teach or suggest all the claimed limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on the Applicant's own disclosure (M.P.E.P. § 2143). Further, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

Thieret et al. relates to a server architecture for monitoring machine data, predicting trends, and providing a corrective response, and to a hierarchical system of providing predetermined degrees of the response on the basis of a single machine, set of machines, or a plurality of sets of machines. *Thieret et al.* discusses that a machine server, connected with a color printer, analyzes the trend of the printer, performs a diagnostic process, and provides machine corrective data. In controlling the quality of images output by a printer 10, the architecture 110 in process controls 11 communicates with the image processing system (IPS) and raster output scanner (ROS). A primary object of architecture 110 is to maintain a desired IOT image quality by maintaining a desired tone reproduction curve (TRC). An image input to be copied or printed has a specific TRC. The IOT

outputting a desired image has an intrinsic TRC. If the IOT is allowed to operate uncontrolled, the TRC of the image output by the IOT will distort the color rendition of the image. Thus, an IOT must be controlled to match its intrinsic TRC to the TRC of the input image. To accommodate and correct for various changes, such as humidity and temperature, architecture 110 takes a system-wide view of the IOT marking engine and controls both the various physical subsystems 113 of the IOT and the inter-relationships between subsystems 113. (Column 4, lines 48-67) Thus, in *Thieret et al.* the IOT outputting the image is controlled (adjusted) to match the image input. In contrast, claim 7 processes the image data in accordance with the condition information of the image output unit.

As correctly stated in the Office Action, *Thieret et al.* fails to teach that a host computer performs image processing of image data comprising of pixels, each having a bit length, in accordance with the condition information transmitted by the transmitter, and quantizing the processed image data, where each of the plurality of image output units outputs an image based on the image data processed by the host computer.

For at least these reasons, Applicant submits that claim 7 is clearly patentable over *Thieret et al.*, taken alone.

The Office Action cites *Laumeyer et al.* as remedying some of the deficiencies of *Thieret et al.* However, if *Thieret et al.* and *Laumeyer et al.* are combined in the manner suggested by the Examiner, the resultant system would transform the input image and not control the IOT outputting the image. Modifying the *Thieret et al.* system with the teachings of *Laumeyer et al.* results in a system where the IOT outputting the image is no longer controlled to match its intrinsic TRC to the TRC of the input image.

The combined system no longer modifies the TRC of the IOT to match the TRC of the input image, because the *Laumeyer et al.* system transforms the specified output image pixel data from frame buffer 16 to output device color values. Specifically, in *Laumeyer et al.,* output image pixel data from frame buffer 16, based on L*a*b* color coordinates, are transformed to pixel data based on CMY color coordinates with coordinate values appropriate for the profile (characterization of a printer for each medium) chosen, and ultimately to CMYK color values for the printer chosen by the operator (Column 12, lines 28-44). That is, the image pixel data is transformed in accordance with the profile of the output device, and not the output device being adjusted to the image pixel data as in *Thieret et al.* Thus, if *Thieret et al.* is modified in the way suggested by the Office Action, this would impermissibly change the principle of operation of *Thieret et al.* Applicant submits, therefore, that a *prima facie* case of obviousness has not been made out.

Furthermore, *Shimomura et al.* and *Satomi et al.* are not seen to remedy the deficiencies of *Thieret et al.* and *Laumeyeret al.*

Independent claims 13 and 15 are method and computer-readable storage medium claims, respectively, corresponding to apparatus claim 7, and are believed to be patentable for at least the same reasons as discussed above in connection with claim 7.

Independent claim 11 includes the similar feature of performing calibration processing of image data comprising of pixels, each having a bit length, in accordance with the <u>updated condition information, acquired by the acquisition unit in response to an image output instruction</u>, where calibration processing decreases a bit length for each pixel of the calibrated image data processed in accordance with the <u>condition information</u> and then

outputting the bit-length-decreased image data to the image output unit via the communication line, as discussed above in connection with claim 1.

Thieret et al. is not seen to overcome the deficiencies of *Laumeyer et al., Zandee et al.*, and *Shimomura et al.* with regards to performing calibration processing of image data comprising of pixels, each having a bit length, in accordance with the <u>updated condition information, acquired in response to an image output instruction</u>, where calibration processing decreases a bit length for each pixel of the calibrated image data processed in accordance with the <u>condition information</u> and then outputting the bit-length-decreased image data to the image output unit via the communication line. In fact, the Office Action correctly states that *Thieret et al.*, among other things, does not teach "an acquisition step, of acquiring the updated condition information stored in the server in response to the image output instruction," as recited in claim 11.

Accordingly, for at least this reason and those discussed above in connection with claims 1 and 7, Applicant submits that claim 11 is clearly patentable over the cited prior art.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

Attorney for Applicant

Registration No. 26,718

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200
NYMAIN 387857